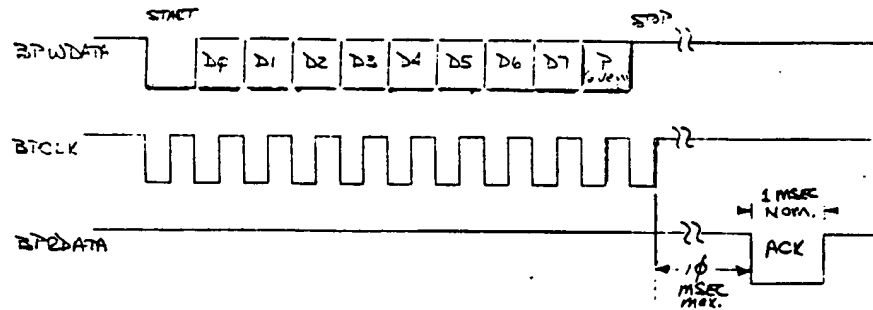
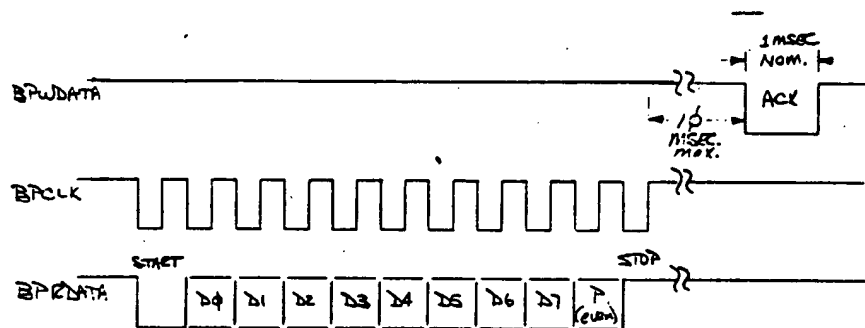


APPENDIX B

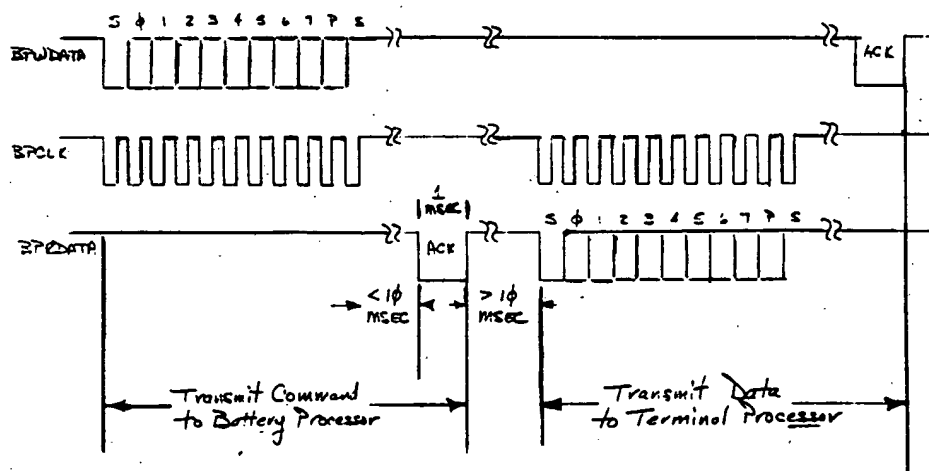
STEVEN E. KOENCK
APPLICATION FOR PATENT "BATTERY
CONDITIONING SYSTEM HAVING
COMMUNICATION WITH BATTERY
PARAMETER MEMORY MEANS IN
CONJUNCTION WITH BATTERY
CONDITIONING" ATTY.DOCKET 5717-Y



Terminal to Battery Processor Communication

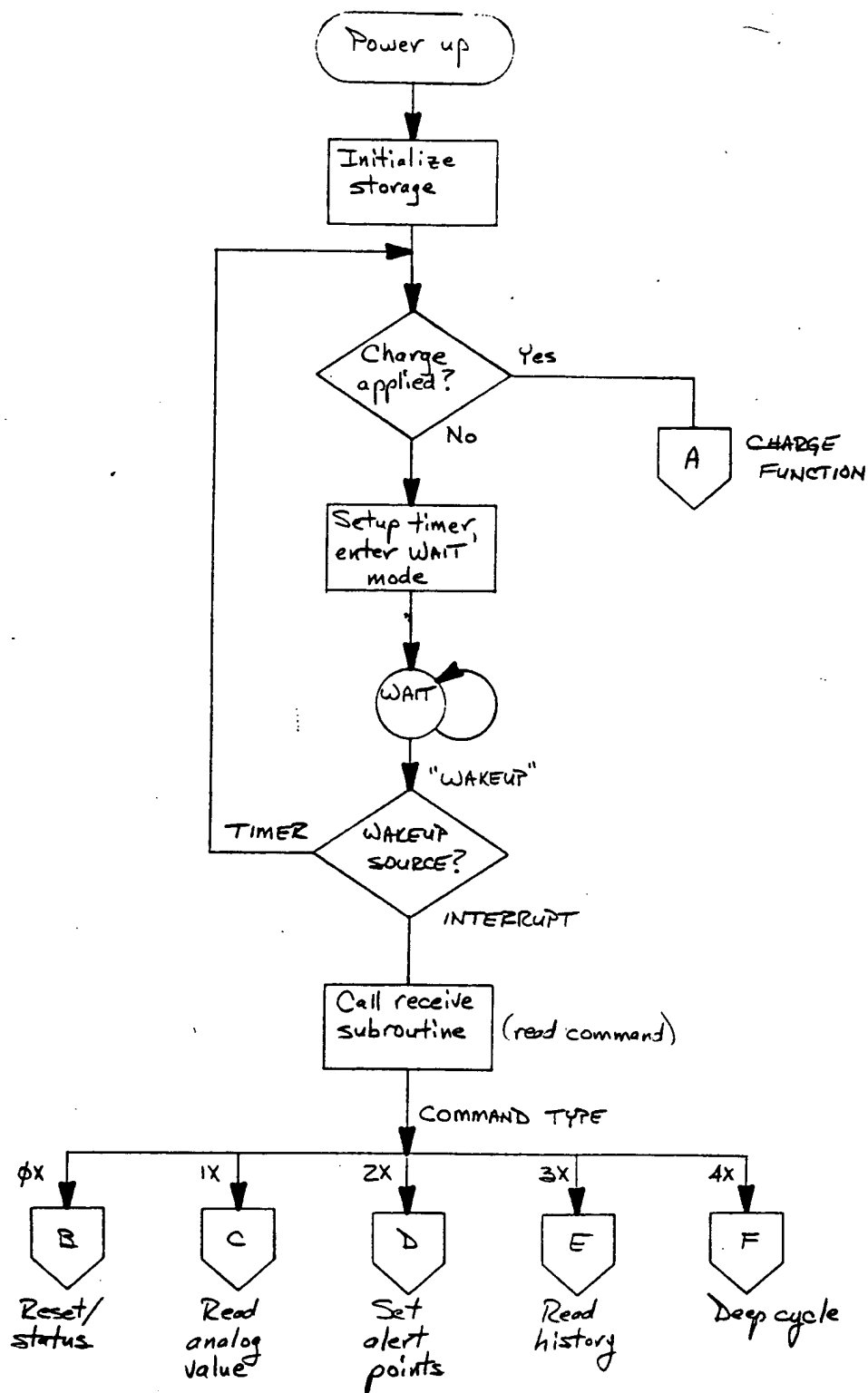


Battery Processor to Terminal Communication

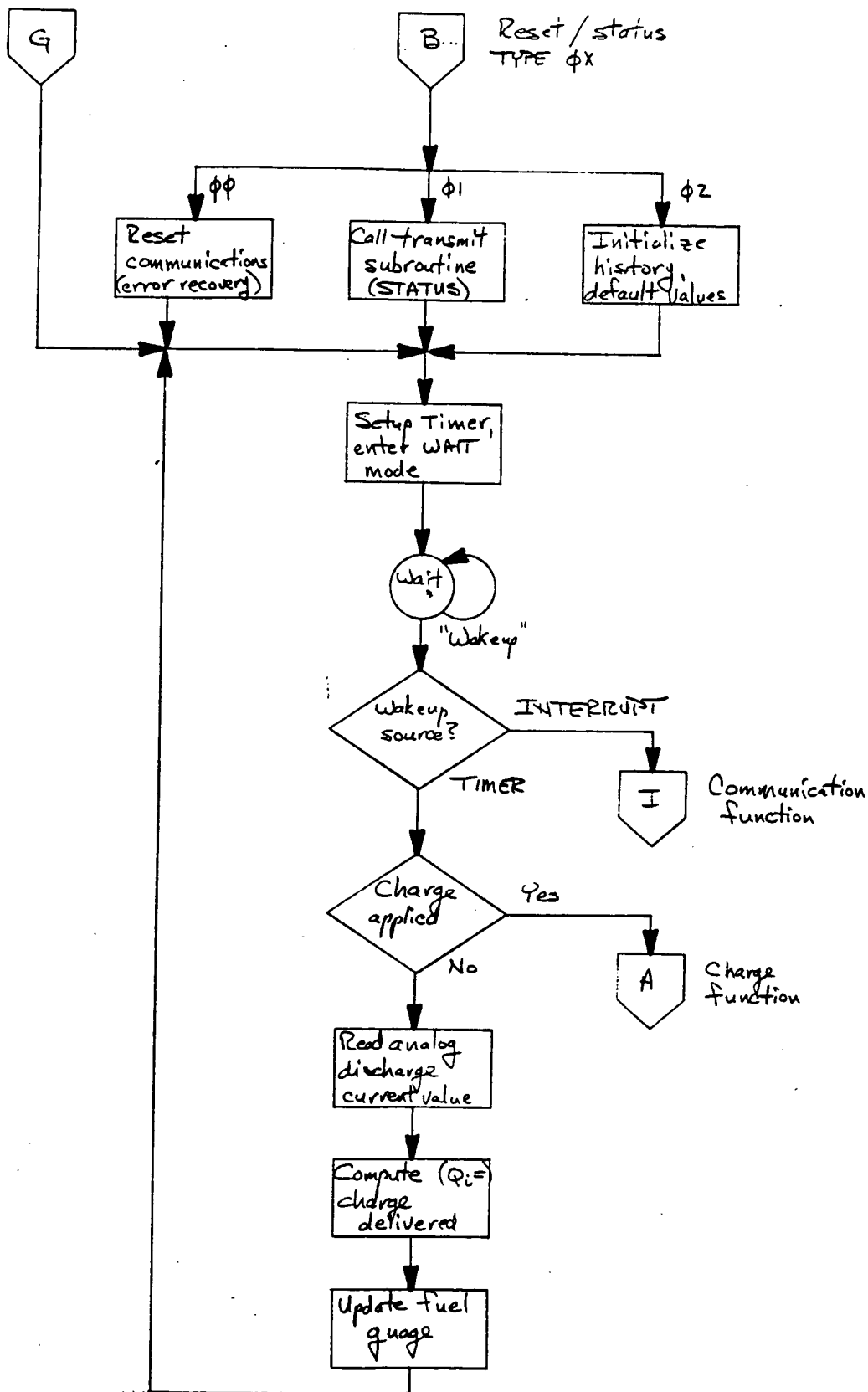


Command/Response Communication Protocol

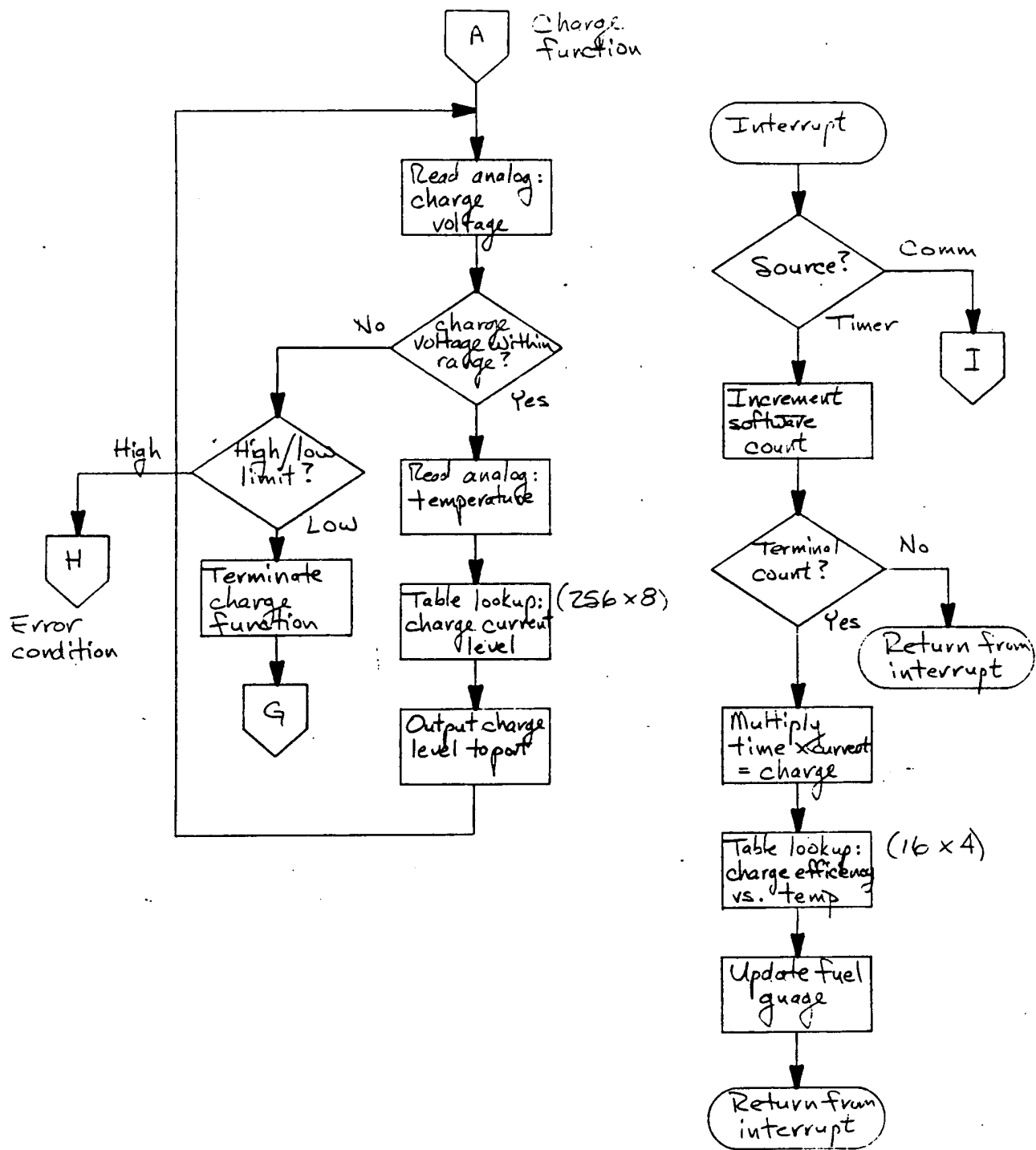
BEST AVAILABLE COPY



BEST AVAILABLE COPY

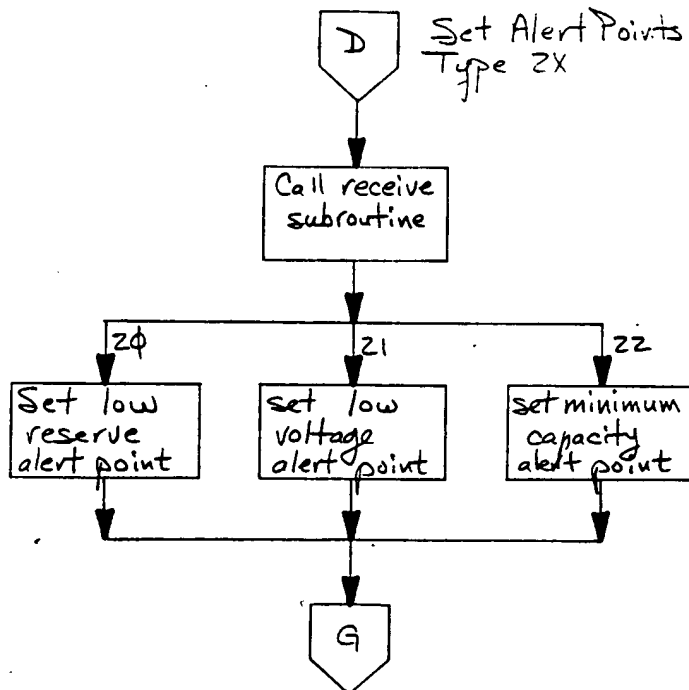
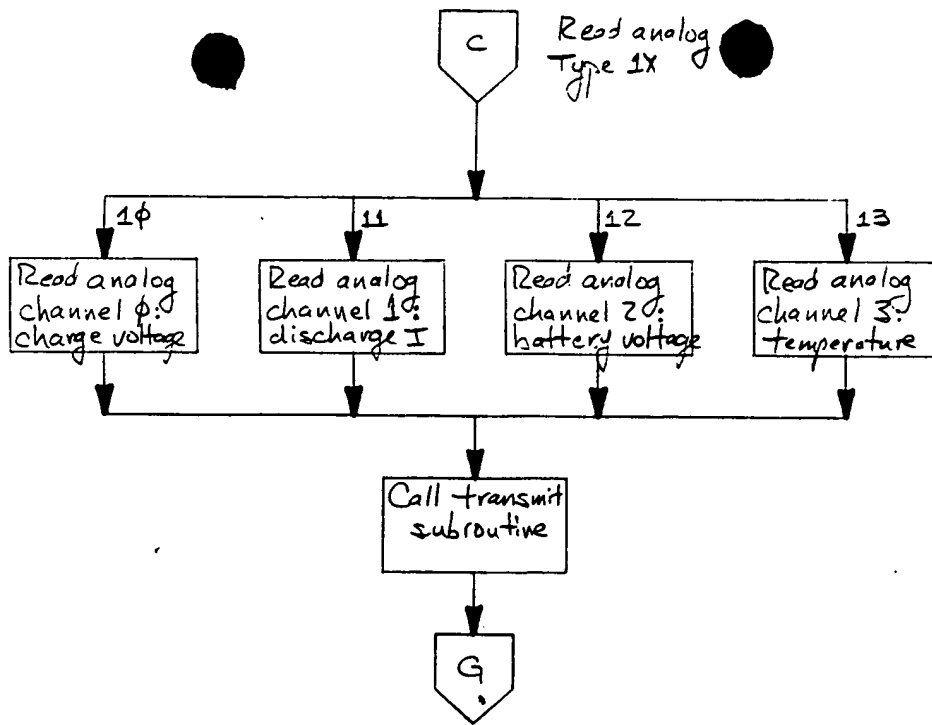


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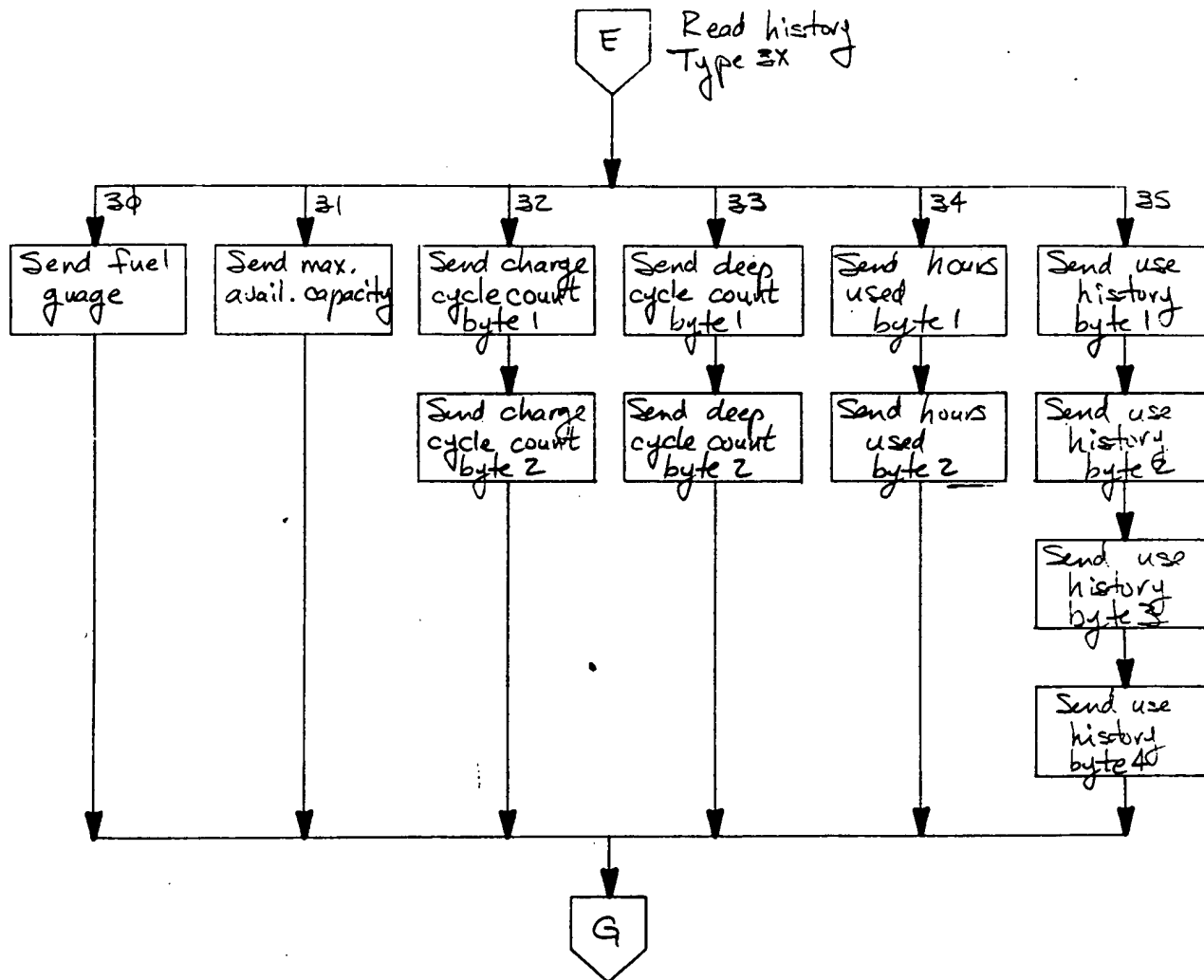


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Note: Processor does not enter WAIT condition during charge.



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F Deep Cycle function
Type 4X

Charge
voltage within
range?

No

Yes

H

Error
condition.

Turn on
discharge
load

Read analog:
battery
voltage

read
charge:
> 75%?

No

battery
voltage
= 4.0V

Yes

turn off
discharge load

Set new
max. avail
capacity

Increment
deep cycle
count

Update ΔC :
max. vs. present
capacity

A

Charge
function

Deep cycle: consider full
charge cycle before
deep discharge

Note: Processor does not enter WAIT
condition during deep discharge

Interrupt

Source?

Comm

Timer

I

Increment
software
count

terminal
count?

No

Return from
Interrupt

Yes

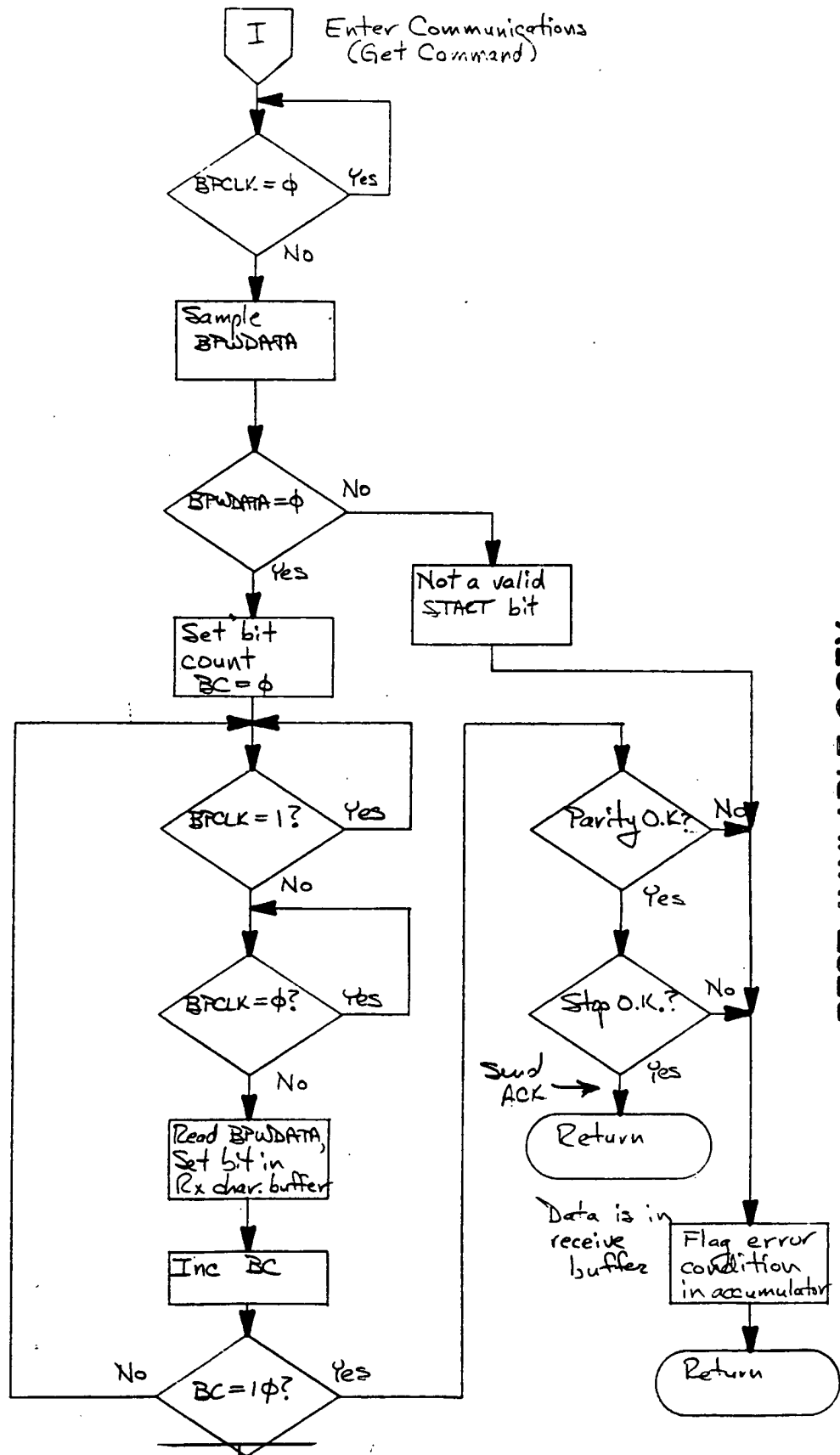
Read analog:
discharge
current

Multiply
time x current
= charge

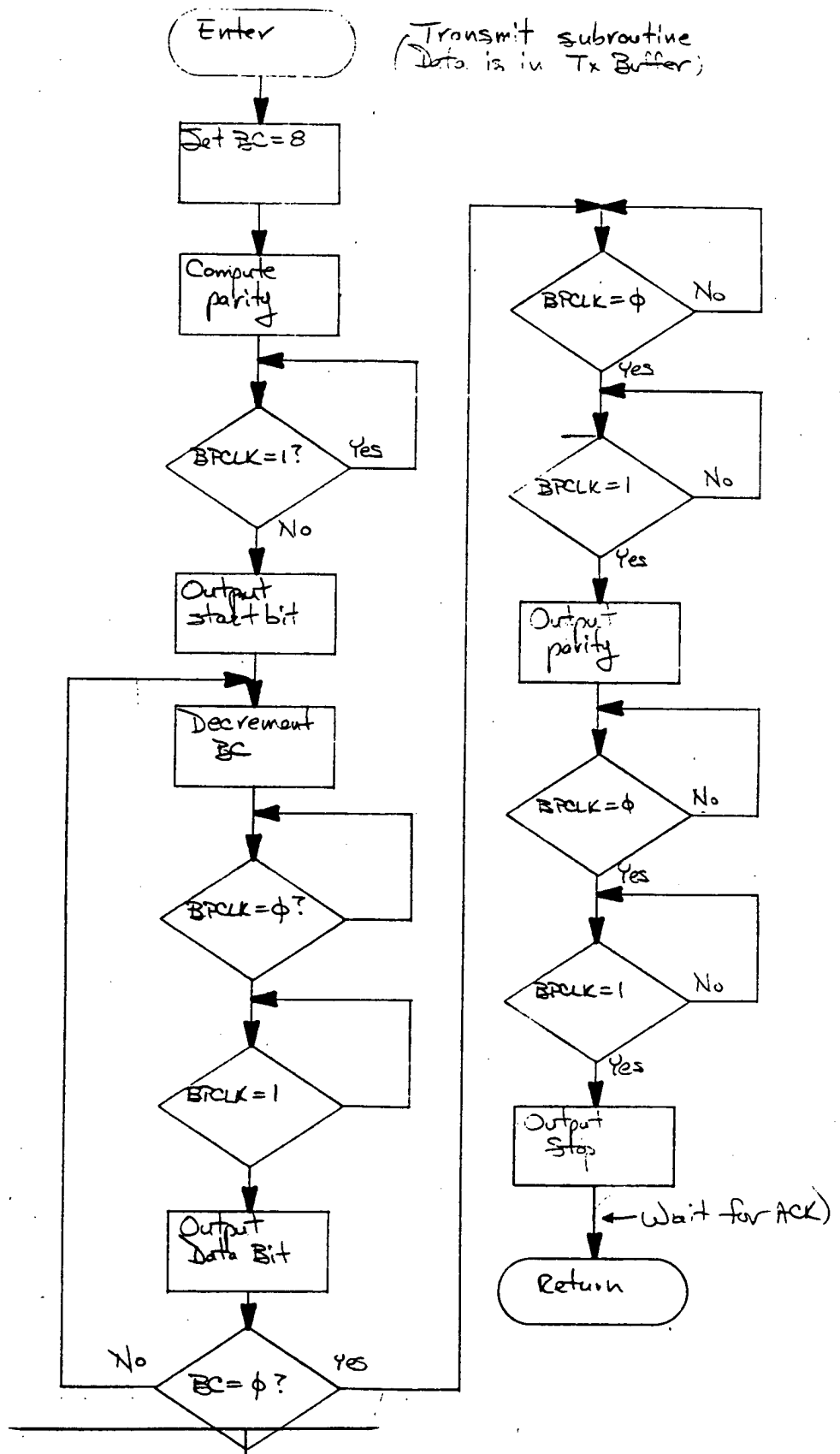
(updating
new C value)

Return from
Interrupt

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Charge level lookup table:

Input variables: 1. Temperature
2. Charge voltage
3. Fuel gauge

1. Temperature: table increments of $4^{\circ}\text{C} \times 16 \text{ steps} = 64^{\circ}\text{C}$, -14°C to $+50^{\circ}\text{C}$
temperatures below -14°C use -14°C value
temperatures above $+50^{\circ}\text{C}$ use $+50^{\circ}\text{C}$ value

2. Charge voltage: table increments of $1.28 \text{ volts} \times 8 \text{ steps} = 10.24 \text{ Volts}$
 $7.0 < V_{\text{CHG}} < 17.24 \text{ V.}$

voltages below 7 volts or above 17.24 volts will cause the charge level to be turned off and an error condition to be transmitted to the terminal processor

3. Fuel gauge: 4 steps:
0-25%
25-50%
50-75%
75-100%

TABLE OUTPUT: 4 bits, binary weighted
charge level = 32 ma/step
 $0 \leq I_{\text{CHG}} \leq 480 \text{ ma}$

TABLE SIZE:

$$16 \times 8 \times 2 = 256 \text{ Bytes}$$

①	②	③
Temp	Chg voltage	%C (4 nibbles)

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